The excretory system of Solenogastres (Mollusca) and its development
DAAD project 2008 Christiane Todt

There are large gaps in knowledge on developmental biology of basal mollusks, such as the Solenogastres. This exclusively marine taxon is of special interest because it is thought by many to represent the most ancestral mollusk lineage, a more basal branch than for example the gastropods or bivalves. Currently, the marine biodiversity lab at BIO is the only one worldwide to keep and raise solenogasters and thus to suppose of material to tackle diverse questions of early and late development.

One of the main interests of the research group of Bernhard Ruthensteiner and Gerhard Haszprunar, Zoological State Collection Munich, is the structure and development of mollusk excretory systems. A current research project funded by the DFG (German Research Foundation) is targeting the smaller mollusk taxa, such as chitons and scaphopods, to complete the picture and give a better basis for outgroup comparison (e.g., with sipunculids and polychaetes). In their project proposal they had pointed out the importance of solenogasters for this topic, but they had also stated that solenogasters have not been chosen as target organisms in the project "… because it is nearly impossible to get distinct post-metamorphic stages of these animals".

So, I have the material and they have the expertise – a perfect match for a joint project! During the six weeks of my research stay in Munich this spring we (Natalie Bäumler - the PhD student involved in the project-, Bernhard Ruthensteiner and me) investigated different developmental stages of the solenogaster *Wirenia argentea* using light and transmission electron microscopy. We found that the larvae have a pair of protonephridia, very similar to the excretory organs in other trochophore-like larvae of mollusks and e.g., polychaetes. Now protonephridia have been found in the larvae of all mollusk classes and this means that these organs – in contrast to the traditional view - are part of a mollusk larval "ground plan". Even more astonishing was the finding of a second pair of posterior protonephridia in metamorphosed juveniles (6 weeks after hatching). These postlarval protonephridia are more complicated (branched) and probably later get integrated into the adult excretory system. This would prove a direct functional connection between a protonephridial and a metanephridial excretory system – something known since two decades from polychaetes but never shown for mollusks. To prove our hypothesis we will have to look into slightly older developmental stages – more plans for the future!

Fig. Wir-larv-SEM: Scanning electron micrograph of a 10 days old solenogaster larva.

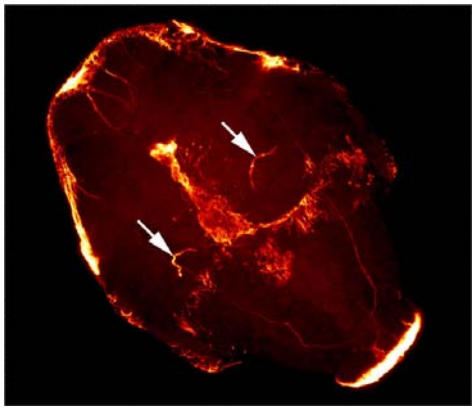

Fig. Wir-larv-CLSM: Confocal laser scanning maximum projection image of a 6 days old solenogaster larva, anti-alpha-tubulin labeling; white arrows mark the pair of protonephridia.

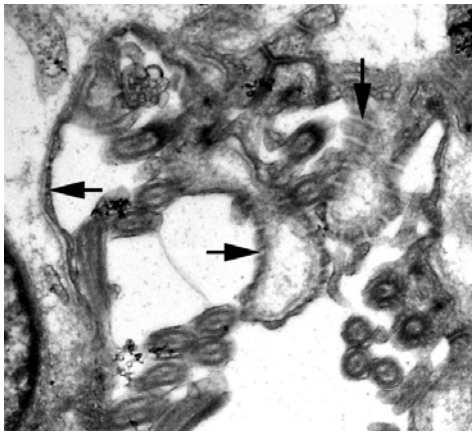

Fig. Wir-postProt-TEM: Transmission electron micrograph of a section from a posterior protonephridium of a 30 days old solenogaster postlarva; black arrows mark ultrafiltration slits in the cell membrane of the terminal cells.